

electric charge is accumulated in the CCD 144a and it appears in an output image signal Va as noise. To cope with this, in the present embodiment, an infrared ray cut-off filter 144c is provided on the video camera 144 so as to remove infrared rays. According to this construction, there is no risk of noise appearing in the output image signal Va even if the detection of the application of lubricant is repeatedly performed, thereby making it possible to perform accurate lubricant application detection in succession.

Since the lubricant applied condition detecting device 40 according to the present embodiment can be incorporated in an automatic machine for applying a lubricant to the rolling bearing 700, it is possible to inspect in line lubricant applied conditions of the total number of rolling bearings. Then, in a case where no application of lubricant is carried out for some reason or where there is happening a failure of application of lubricant, the rolling bearing under inspection is discharged from the aforesaid inspection line based on an NG signal from the application detecting device 140, or the machine is automatically temporarily stopped, whereby the rolling bearing judged as defective is prevented from being transferred to a post process. Consequently, mixing of a defective into rolling bearing products can be prevented, whereby rolling bearings with high quality can be produced.

According to the present invention, as has been described heretofore, since lubricant can be applied easily and securely only to portions such as the rolling elements inside the rolling bearing and the raceway surfaces which actually need lubrication, the lubricant does not adhere to portions other than those which actually need lubrication such as the external side of the rolling bearing. Therefore, a required volume of lubricant is secured in the interior of the rolling bearing, whereas the external side of the rolling bearing is left sufficiently dry. Thus, this lubricant application are optimally suitable for use for an apparatus such as a hard disk drive needing a high degree of cleanness in the interior thereof, and there is also provided an advantage in which a rolling bearing can be produced at low costs which can reduce the torque and perform stabilization thereof.

Furthermore, there is provided an advantage in which a volume of lubricant to be applied to the rolling elements inside the rolling bearing can be controlled in an accurate fashion.

In addition, according to the method and apparatus for inspecting a lubricant applied condition of a rolling bearing according to the present invention, the laser beam is irradiated toward between the discharge port of the lubricant discharge device and the rolling bearing, and the reflected laser beam reflected by the lubricant when it is discharged from the discharge port is received by the photoreceptor device disposed on the optical axis of the reflected laser beam, whereby whether or not the lubricant is applied to the rolling bearing is inspected based on the output from the photoreceptor device. This prevents a rolling bearing from failing to be properly applied with the lubricant from being transferred to a post process, whereby not only can the reliability of the rolling bearing itself be improved but also the reliability of equipment using that rolling bearing can be prevented from being deteriorated.

While only certain embodiments of the invention have been specifically described herein, it will apparent that numerous modification may be made thereto without departing from the spirit and scope of the invention.

The present disclosure relates to the subject matter contained in Japanese patent application Nos. Hei.10-370097 filed on Dec. 25, 1999 and Hei.11-161260 filed on Jun. 8, 1999 which are expressly incorporated herein by reference in its entirety.

What is claimed is:

1. An inspecting apparatus of a lubricant applied condition of a rolling bearing, which inspects whether or not a lubricant is applied to said rolling bearing in a line, the lubricant being from a lubricant application device incorporated in an automatic machine for applying said lubricant to said rolling bearing,

wherein said lubricant comprises an addition agent emitting fluorescence based on excitation by an ultraviolet ray, and wherein said addition agent is an amine antioxidant.

2. The inspecting apparatus according to claim 1, comprising:

a projecting element irradiating an illuminate light to a lubricant position of said rolling bearing where said lubricant is discharged from a discharge port of said lubricant application device;

a photoreceptive element receiving a reflected light reflected when said lubricant is disposed on said lubricant position; and

a determining means for determining whether or not said lubricant is applied to said rolling bearing based on an output from said photoreceptive element,

wherein the inspecting apparatus inspects said lubricant applied condition of said rolling bearing when said rolling bearing is substantially stopped;

said projective element is a luminance having wavelength that makes said addition agent of said lubricant emit fluorescence; and

said photoreceptive element receives the fluorescence emitted from said lubricant.

3. The inspecting apparatus according to claim 2, wherein said projective element is disposed between said photoreceptive element and said rolling bearing and concentrically with a center axis of said rolling bearing; and

said projective element includes an illuminant light reflecting plate shutting off said illuminant light irradiated to a photoreceptive element side.

4. The inspecting apparatus according to claim 1, comprising;

a light shielding hood for preventing said bearing to be inspected from being exposed to an outside light;

a black light lamp provided inside said light shielding hood for irradiating an ultraviolet ray to an interior of said bearing; and

a video camera for picking up an image of said bearing to which said ultraviolet ray from aid black light lamp is irradiated.

5. The inspecting apparatus according to claim 4, wherein said ultraviolet ray irradiated from said black light lamp has a wavelength of 300–400 nm.

6. The inspecting apparatus according to claim 4, wherein said video camera includes an image pick-up device, a condensing lens and an infrared ray cut-off filter.

7. The inspecting apparatus according to claim 4, wherein said lubricant is lubricating oil.

8. The inspecting apparatus according to claim 4, wherein said lubricant is grease.